IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF HAWAII

UNITED STATES OF AMERICA, Plaintiff, vs. AUSTIN-ERNEST KAHOLO HOLMES, Defendant.	)	CR. NO. 15-00245-01 SOM CR. NO. 15-00410-01 SOM ORDER DETERMINING THAT, FOR PURPOSES OF CALCULATING THE SENTENCING GUIDELINE RANGE, METHCATHINONE IS THE LISTED DRUG MOST CLOSELY RELATED TO ETHYLONE

ORDER DETERMINING THAT, FOR PURPOSES OF CALCULATING THE SENTENCING GUIDELINE RANGE, METHCATHINONE IS THE LISTED DRUG MOST CLOSELY RELATED TO ETHYLONE

This court is asked to determine which drug listed in the Drug Equivalency Tables of § 2D1.1 of the United States Sentencing Guidelines is most closely related to ethylone, a drug not mentioned in the Sentencing Guidelines. Having heard from dueling scientists during two days of testimony, this court agrees with Defendant Austin-Ernest Kaholo Homes that methcathinone is the listed drug most closely related to ethylone.

This conclusion relates solely to the calculation of the guideline range applicable in this case, not to whether, once the guideline range has been determined, there may or may not be good reasons for this court to vary from that guideline range, a matter the court will address at an upcoming hearing. That is, this court is not here addressing any challenge to how the Sentencing Guidelines characterize methcathinone or any argument

as to how this court should ultimately treat ethylone, although the court fully expects such challenges and arguments to be raised in connection with a defense request for a variance from the guideline range.[1]

I. BACKGROUND INFORMATION

Pursuant to a plea agreement, Holmes pled guilty to possessing ethylone with intent to distribute it, possessing a semi-automatic pistol while being an unlawful user of a

[1] While recognizing that the evidence presented in connection with the guideline calculation issue is related to the variance issue, the court is at pains to distinguish between the two. The variance issue involves considerably more discretion than the guideline calculation. See Spears v. United States, 555 U.S. 261, 264 (2009); Kimbrough v. United States, 552 U.S. 85, 102-10 (2007). Prior to the present case, this judge's involvement with challenges to the application of the Drug Equivalency Tables involved only the variance context. Thus, in a case involving Ecstasy, United States v. Long, Criminal No. 14-00178, the defense asked this judge to vary from the guideline range in light of what the defense argued was the Sentencing Commission's unwarranted treatment of MDMA, or Ecstasy. The defense noted that the Sentencing Guidelines treated 1 gram of MDMA as equivalent to more than twice as much marihuana as 1 gram of cocaine. In that case, there was no dispute relating to the calculation of the guideline range. This judge imposed a sentence of 15 months in custody, a considerable variance from the guideline range of 57 to 71 months, but in so doing this judge found it unnecessary to address the treatment of MDMA by the guidelines, relying on other factors to reduce the sentence while neither accepting nor rejecting the defense argument on that subject. In a different case in this district, United States v. Dafang, Criminal No. 14-00722, Judge J. Michael Seabright accepted the argument by the defense that the treatment of MDMA by the Sentencing Commission was unreasonable and on that ground varied downward from the guideline range. Because both Long and Dafang involved MDMA , a substance expressly addressed by the Sentencing Guidelines, neither of those cases required the kind of guideline analysis required in the present case.

controlled substance, and possessing methamphetamine. The present order resolves a dispute between Holmes and the Government over the Base Offense Level applicable under the Sentencing Guidelines to the charge of possessing ethylone with intent to distribute it.

The Indictment filed in Criminal No. 15-00245 describes ethylone as going by the street names "bath salts" and "molly" and as being "a positional isomer of butylone, a Schedule 1 controlled substance." There is no dispute that ethylone, as an isomer of butylone, is indeed a Schedule 1 controlled substance. See 21 C.F.R. § 1308 (temporary placement by DEA of 10 synthetic cathinones, including butylone, into Schedule 1, effective March 7, 2014).

As part of its consideration of factors affecting what sentence to impose, this court must calculate the applicable guideline range provided for by the United States Sentencing Guidelines. See 18 U.S.C. § 3553(a)(4)(A). Under the Sentencing Guidelines, the Base Offense Level applicable to a drug charge turns on the type and amount of drug involved, as set forth in § 2D1.1 of the Sentencing Guidelines. While § 2D1.1 assigns Base Offense Levels to a number of controlled substances, neither butylone nor ethylone is mentioned in § 2D1.1.

Application Note 6 to § 2D1.1 sets forth a procedure for determining the Base Offense Level "[i]n the case of a

controlled substance that is not specifically referenced in this guideline." The court is directed to "determine the base offense level using the marihuana equivalency of the most closely related controlled substance referenced in this guideline." Drug Equivalency Tables are included in Application Note 8(D) to § 2D1.1. Those tables list a variety of drugs, providing with respect to each listed drug a corresponding amount of marihuana. For example, 1 gram of heroin is listed as equivalent to 1 kilogram of marijuana, and 1 gram of cocaine is listed as equivalent to 200 grams of marihuana.

Application Note 6 outlines three factors that "the court shall, to the extent practicable, consider" in determining "the most closely related controlled substance":

> (A) Whether the controlled substance not referenced in this guideline has a chemical structure that is substantially similar to a controlled substance referenced in this guideline.
>
> (B) Whether the controlled substance not referenced in this guideline has a stimulant, depressant, or hallucinogenic effect on the central nervous system that is substantially similar to the stimulant, depressant, or hallucinogenic effect on the central nervous system of a controlled substance referenced in this guideline.
>
> (C) Whether a lesser or greater quantity of the controlled substance not referenced in this guideline is needed to produce a substantially similar effect on the central nervous system as a controlled substance referenced in this guideline.

The Government has taken the position that this court should rely on testimony by the Government's two expert witnesses

to conclude that, considering the three factors listed in Application Note 6, the controlled substance listed in the Drug Equivalency Tables that is most closely related to ethylone is 3,4-methylenedioxy-N-ethylamphetamine ("MDEA"), 1 gram of which is listed as equivalent to 500 grams of marijuana (the same ratio provided for MDMA). If the court accepts the Government's position, the guideline range will be 57 to 71 months.

Relying on two defense expert witnesses, Holmes counters that the listed substance most closely related to ethylone is methcathinone, which has a 1:380 equivalency.[2] If this court adopts Holmes's position, the Base Offense Level will be 2 levels below that urged by the Government, resulting in a guideline range of 46-71 months.

The Probation Office preliminarily accepted the Government's position and prepared a Presentence Investigation Report that treated MDEA as the listed drug most closely related to ethylone for purposes of calculating the guideline range. However, at that time, the Probation Office did not have Holmes's challenge to that position. Holmes had originally indicated that, while MDEA was correctly used for guideline calculation

[2] As the Government has indicated it recognizes, Holmes is not, in identifying methcathinone as the most closely related drug listed in the Drug Equivalency Tables, conceding that the 1:380 ratio is appropriate for ethylone. To the contrary, Holmes has already indicated that, in connection with a variance request, he plans to argue that the 1:380 ratio is unwarranted for methcathinone, and even more unwarranted for ethylone.

purposes, he planned to seek a variance by arguing that the Sentencing Commission's 1:500 ratio for MDEA was not empirically sound. Holmes subsequently amended his position and challenged the guideline calculation. The Probation Office is now awaiting this court's ruling to see whether it should redo its guideline calculations.

This court heard from competing witnesses about the chemical structure of ethylone. The Government called Dr. Daniel Willenbring, who has a Ph.D. in organic chemistry and is a drug science specialist with the Drug Enforcement Administration based in Virginia. Holmes called Dr. Mark Hagadone, who has a Ph.D. in organic chemistry and who runs a chemistry consultant's business in Honolulu, Hawaii.

Different witnesses testified about the effects of using ethylone. The Government called Dr. Cassandra Prioleau, who has a Ph.D. in pharmacology and is a drug science specialist with the DEA in Virginia. Dr. Prioleau declined to opine about the potency of ethylone. Holmes called Dr. John Halpern, M.D., who is an assistant professor of psychiatry at Harvard Medical School and is the psychiatrist-in-charge of Coverage, Alcohol and Drug Abuse Treatment Programs at McLean Hospital in Belmont, Massachusetts. Dr. Halpern testified about the effects as well as the potency of ethylone.

The three out-of-state expert witnesses (Dr. Willenbring, Dr. Prioleau, and Dr. Halpern) have experience testifying about the Drug Equivalency Tables. See, e.g., United States v. Brey, 627 Fed. App'x 775 (11th Cir. 2015) (referring to testimony by Drs. Willenbring and Prioleau that listed drug most closely related to ethylone is MDEA); United States v. Marte, 586 Fed. App'x 574 (11th Cir. 2014) (noting testimony by Dr. Prioleau in district court that methylone was most closely related to MDMA); United States v. Ketchen, 2015 WL 3649486 (D. Me. June 11, 2015)(referring to grand jury testimony by Dr. Prioleau comparing effects of using methcathinone to effects of using MDPV); United States v. McCarthy, 2011 WL 1991146 (S.D.N.Y. May 19, 2011) (summarizing testimony by Dr. Halpern in support of variance from guideline range based on alleged flaws in Sentencing Commission's setting of 1:500 MDMA-to-marihuana ratio). See also ECF No. 67-2 (Government's submission of transcript of testimony about MDMA by Dr. Halpern in United States v. Thammavongsa, Case No. 2:13-cr-255-JAD-GWF (D. Nev. Dec. 3, 2014)).

In the present case, all four expert witnesses were extensively cross-examined after their detailed direct examinations. Holmes's vigorous opposition to the Government's expert witnesses' testimony distinguishes this case from United States v. Brey, which involved consideration of the three factors in Application Note 6 with respect to ethylone, the very drug in

issue here. The Eleventh Circuit in Brey affirmed the district court's conclusion that MDEA, with its 1:500 ratio, was the listed drug most closely related to ethylone. As the Eleventh Circuit noted, the district court was not presented with contrary evidence: "The government produced reliable and specific evidence of the first two factors, chemical structure and effect on the user, which Brey does not challenge." 627 Fed. App'x at 780.

A Westlaw search has yielded a relatively small number of other federal cases involving ethylone. Some of the orders in those cases disposed of motions to suppress and did not address Application Note 6. The court did find a reference in Westlaw to a party's brief in United States v. Chauca, Case No. 8:14-CR-409-T-36TBM, which caused this court to look at the electronic case file in that case. From what the court can tell, Chauca and United States v. Palfalvi, Case No. 2:14-CR-79-FIM-38DNF, are ethylone cases filed in the Middle District of Florida. It appears that, in both cases, the Government offered Dr. Willenbring and Dr. Prioleau, and the defense offered Dr. Gregory Dudley, a professor of chemistry at Florida State University. In those cases, the defense expert, unlike the witnesses offered in the present case by Holmes, appears to have agreed with Government witnesses that the listed substance most closely related to ethylone was MDEA. The defense relied on Dr. Dudley

not for purposes of calculating any guideline range but rather in arguing for variances from the guideline ranges based on application of a marijuana ratio for ethylone lower than the guideline ratio for MDEA. As this court noted earlier, while the court understands that it will be asked to vary from whatever guideline range is calculated, the present order is restricted to determining which listed drug is most closely related to ethylone for guideline calculation purposes.

Unlike the defendants in Brey and in the Florida cases referred to above, Holmes has directly challenged the Government's evidence relating to the guideline calculation for ethylone. Defense counsel not only cross-examined Dr. Willenbring and Dr. Prioleau, counsel also offered testimony by Dr. Hagadone and Dr. Halpern. Notably, in Brey, the Government provided no evidence as to the potency of ethylone, stating in that case, as it stated here, that it lacked reliable data as to potency. While the defendant in Brey attacked the Government's position in light of the absence of potency evidence, he himself did not attempt to fill that void. 627 Fed. App'X at 780-81. Holmes, by contrast, presented Dr. Halpern's opinion concerning potency.

The record before this court causes this court to reach a different conclusion from that reached in Brey.

II. CONSIDERATION OF THE THREE FACTORS IN APPLICATION NOTE 6.

A. Chemical Structure.

Subsection (A) of Application Note 6 directs the court to consider whether ethylone has "a chemical structure that is substantially similar to a controlled substance" referenced in § 2D1.1. This court heard testimony comparing the chemical structure of ethylone to the chemical structures of MDEA and of methcathinone. (Along the way, this court also heard testimony about the chemical structures of a wide variety of other substances.)

Both Dr. Willenbring, testifying for the Government, and Dr. Hagadone, testifying for Holmes, said that, in reaching their different conclusions about which listed controlled substance's chemical structure was substantially similar to the chemical structure of ethylone, they focused on the "core structure" of ethylone. Both witnesses relied on the definition of "core structure" in 21 C.F.R. § 1300.01 ("Definitions relating to controlled substances").

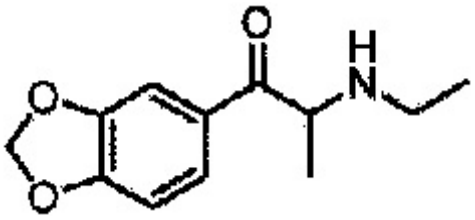
The definition of "core structure" is included in the definition of "isomer," which is relevant here because ethylone is a positional isomer of butylone:

> [T]he term "positional isomer" means any substance possessing the same molecular formula and core structure and having the same functional group(s) and/or substituent(s) as those found in the respective Schedule I hallucinogen, attached at any position(s) on

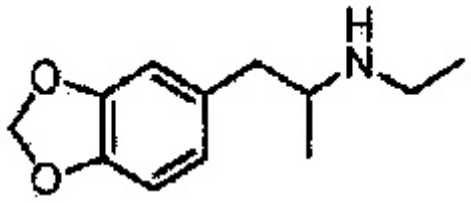
> the core structure, but in such manner that no new chemical functionalities are created and no existing chemical functionalities are destroyed relative to the respective Schedule I hallucinogen. Rearrangements of alkyl moieties within or between functional group(s) or substituent(s), or divisions or combinations of alkyl moieties, that do not create new chemical functionalities or destroy existing chemical functionalities, are allowed i.e., result in compounds which are positional isomers. For purposes of this definition, the "core structure" is the parent molecule that is the common basis for the class; for example, tryptamine, phenethylamine, or ergoline. Examples of rearrangements resulting in creation and/or destruction of chemical functionalities (and therefore resulting in compounds which are not positional isomers) include, but are not limited to: Ethoxy to *alpha*-hydroxyethyl, hydroxy and methyl to methoxy, or the repositioning of a phenolic or alcoholic hydroxy group to create a hydroxyamine. Examples of rearrangements resulting in compounds which would be positional isomers include: *Tert*-butyl to *sec*-butyl, methoxy and ethyl to isopropoxy, N,N-diethyl to N-methyl-N-propyl, or *alpha*-methylamino to N-methylamino.

21 C.F.R. § 1300.01.

There is no dispute as to what the chemical structures of ethylone, MDEA, and methcathinone are. The court includes diagrams of the chemical structures of those substances here, using "bond-line notations," which represent molecules using a simplified convention in chemistry that deletes letter references to carbon atoms and to hydrogen atoms that are attached to carbon atoms. The angles where two lines meet represent places where carbon atoms attach.



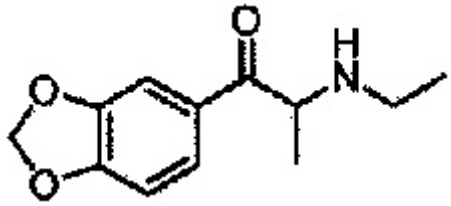
ethylone



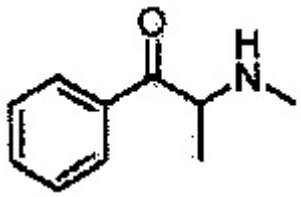
MDEA

When drawn in two dimensions, ethylone and MDEA have chemical structures that are visibly substantially similar. As depicted in the drawings above, the only difference between the chemical structures of ethylone and MDEA is the inclusion in ethylone of a double-bonded single oxygen atom at what is called the *beta* position. That oxygen represents a ketone, and the testimony before the court often used the term "*beta* keto" in referring to that part of ethylone.

Depicted in two dimensions, ethylone and methcathinone appear less similar to each other than ethylone and MDEA:



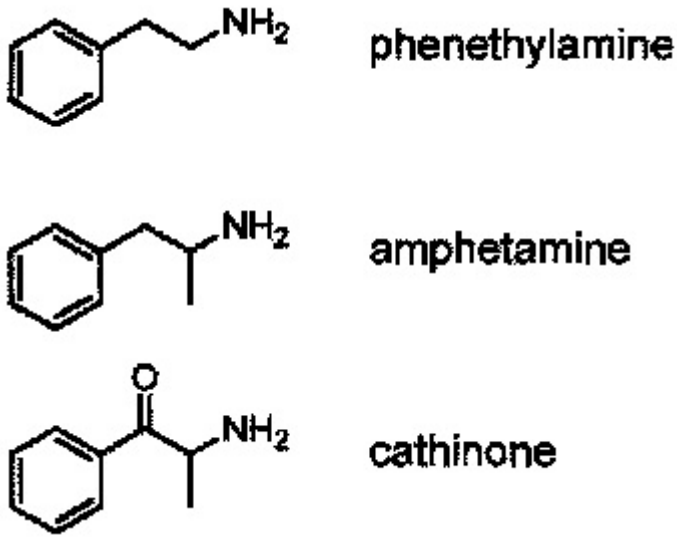
ethylone



methcathinone

Dr. Willenbring said that ethylone and MDEA both have phenethylamine as their core chemical structure. He described ethylone and MDEA as both having the same substitutions to the phenethylamine core: "Ethylone and MDEA share the same core chemical structure and are both substituted with the same substituents at the *a*-position, nitrogen (N) atom, and 3,4-positions." See Government Exhibit 3 at 2.

Dr. Willenbring looked at three chemical groups relevant to the matter before the court: phenethylamine, amphetamine, and cathinone. The following diagrams apply to those groups:



See Government Exhibit 4 at 1.

As Dr. Willenbring explained, the diagrams above indicate that all amphetamines are phenethylamines, but not all

phenethylamines are amphetamines, and that all cathinones are both phenethylamines and amphetamines, but not vice versa. See Government Exhibit 4 at 3. Ethylone, MDEA, and methcathinone are all phenethylamines as well as amphetamines. Ethylone and methcathinone are also cathinones. Id.

Dr. Willenbring noted that the definition of "core structure" at 21 C.F.R. § 1300.01 identified phenethylamine as an example of a parent molecule that is the common basis for a class. He concluded that the core structure for both ethylone and MDEA was phenethylamine.

Dr. Hagadone, however, testified that the two-dimensional diagrams did not capture the totality of what this court needed to consider about chemical structures. He noted that the molecule existed in three dimensions, and that the additional dimension spoke to how the molecule operated and how the human body reacted to it. In his opinion, analysis of chemical structure involves not just the geometry of a molecule but also consideration of the nature of the atoms and the oxidation status of the atoms.

Critical to Dr. Hagadone's analysis was the "cathinone moiety" within ethylone that caused him to place ethylone in the cathinone family. He testified that a "moiety" was a significant section of a molecule. He opined, "The cathinone moiety is responsible for the 'family' member's physiological and

psychological properties including the drug's 'abuse potential.'" See Holmes Exhibit A at 5. He likened ethylone to methcathinone, "with its close structural similarities (cathinone moiety)," noting, among other things, that this allowed ethylone to be eliminated from the body more readily than MDEA. Id. at 5,7. Challenging the Government's treatment of ethylone's *beta*-ketone as a minor difference in chemical structure from MDEA, Dr. Hagadone said in his written opinion, "Our argument is that it is NOT just a single oxygen substitution but it is *THE CHEMICAL OXIDATION* of a carbon atom resulting in the addition of an oxygen atom." Id. at 5. He concluded that ethylone was substantially similar "to the cathinone family of analogues" and not to the phenethylamine family "due to the presence of its uniquely oxidized carbon *moiety*." Id.

The Government complained that, although purporting to testify about chemical structures (the first factor listed in Application Note 6), Dr. Hagadone was including in his opinion issues going to ethylone's effect and potency (the second and third factors listed in Application Note 6). The Government has a point. Matters such as the ease of eliminating a substance from the body do indeed concern the effect and potency of a drug. However, it is not clear that chemistry easily lends itself to analysis in the three separate categories listed in Application Note 6. Whether or not the Sentencing Commission, in creating

those distinct categories, had significant input from scientists, discussion of the effect of a chemical structure on something like ease of elimination from the body may, at least to some degree, be inseparable from discussion of the chemical structure itself. Dr. Hagadone's failure to stay within what may be the artificial delineations in Application Note 6 may not necessarily reduce the force of his opinion as to chemical structure.

Having said that, however, this court is conscious that Dr. Willenbring expressed no difficulty in focusing solely on the first factor in Application Note 6, presenting an opinion largely devoid of reference to ethylone's effect or potency. His approach, which might seem to be that of a "purist," was echoed by the Government's other expert witness, Dr. Prioleau. Dr. Prioleau testified that effect and potency were more matters of pharmacology, which examines how drugs affect humans, than chemistry. Possibly, Dr. Willenbring's separation of his chemical structure analysis from the issues of effect and potency was aided by his experience in dealing with the factors as they are listed in Application Note 6. As noted earlier in this order, Dr. Willenbring has testified in other proceedings of this nature. Dr. Hagadone was not among the three out-of-state witnesses that this court noted earlier in this order have been called upon to opine on the Drug Equivalency Tables in § 2D1.1.

Thus, Dr. Hagadone, while an experienced expert witness, may have less background in applying the categories in Application Note 6.

The record is not sufficient to allow this court to determine that one expert's method of analyzing chemical structure is superior to the other's. That is, this court cannot tell whether the chemical structure factor in Application Note 6 should be treated as fitting into a separate box, or whether there is considerable spillover into the effects and potency boxes. It may well be that one method is preferable, or that only the degree of spillover is debatable. If the experts had addressed not only each other's opinions but also the issue of whether, why, and to what degree effect and potency may or may not be considered in analyzing chemical structure, that might have allowed this court to credit one expert's approach over the other's. That did not occur here. With neither party asserting a Daubert challenge to any expert opinion, this court fully considers both Dr. Willenbring's and Dr. Hagadone's opinions.

Because Dr. Willenbring and Dr. Hagadone disagreed as to which "core structure" to assign to ethylone, they identified different listed substances as substantially similar to ethylone.

What this court draws from the testimony it received concerning ethylone's chemical structure is that both Dr. Willenbring and Dr. Hagadone provided persuasive analyses. Fortunately, at least for purposes of the task now before this

court, the court need not determine whether ethylone's chemical structure is more similar to MDEA than to methcathinone, or vice versa. Application Note 6 directs the court to examine whether ethylone "has a chemical structure that is substantially similar to a controlled substance referenced" in § 2D1.1. The language of Application Note 6 suggests to this court that it need not determine whether ethylone is more similar to MDEA than to methcathinone or more similar to methcathinone than to MDEA. Rather, this court need only determine whether a listed substance has a chemical structure that is substantially similar to ethylone. This court concludes that ethylone has a chemical structure that is substantially similar to **both** MDEA and methcathinone. Nothing in Application Note 6 restricts this court to recognizing only a single substantially similar chemical structure.

Thus, as to the chemical structure factor, there is a draw between MDEA, submitted by the government, and methcathinone, submitted by Holmes.

B. Stimulant, Depressant, or Hallucinogenic Effect.

The second factor in Application Note 6 involves consideration of whether ethylone has a stimulant, depressant, or hallucinogenic effect that is substantially similar to the effect of a listed substance. Dr. Prioleau testified for the Government, and Dr. Halpern testified for Holmes on this matter.

Both witnesses concluded that ethylone has a stimulant effect and provided the technical background for this conclusion. They examined ethylone's inhibiting of dopamine transporter, serotonin transporter, and norepinephrine transporter. Both referred to studies and other materials they had reviewed.

Dr. Prioleau concluded that ethylone's stimulant effect is substantially similar to MDEA's stimulant effect. Dr. Halpern did not disagree, but added several other listed drugs with substantially similar effect. Thus, he opined that ethylone is "a cathinone with stimulant and MDMA-like properties," that ethylone "shares stimulant and empathogenic effects to MDMA," and that the effects of ethylone, MDMA, MDEA, methylone, methcathinone, as well as other drugs are similar. See Holmes Exhibit C at 1, 4-5.

Once again, this court sees no need to invent a dispute when there is none. Application Note 6 does not preclude the existence of more than one listed substance with an effect substantially similar to that of ethylone. Putting aside the likelihood that there are numerous other listed substances that qualify as substantially similar in effect to ethylone, this court concludes that **both** MDEA and methcathinone have effects on the nervous system substantially similar to ethylone.

C. Potency.

Application Note 6 requires a third consideration: whether a lesser or greater quantity of ethylone is needed to produce a substantially similar effect on the central nervous system as a listed substance.

The Government provided no evidence going to this third factor. Dr. Prioleau said she had reviewed the available scholarship but considered it insufficient to support any opinion as to ethylone's potency.

Dr. Halpern did not share that view and opined that ethylone was considerably less potent than numerous listed substances, including both MDEA and methcathinone. He criticized several marijuana ratios in the Drug Equivalency Tables as incompatible with today's scientific data. He pointed, for example, to cocaine, which has a 1:200 ratio, and questioned why drugs like MDMA and MDEA had 1:500 ratios when they were less harmful than cocaine. He not only described a study he had conducted involving MDMA users, he also noted that cocaine use results in more medical emergencies, more deaths, more violence, and more abuse than MDMA or MDEA use.

Dr. Halpern referred to a study with laboratory animals that were trained to toggle a bar when experiencing the effects of MDMA. When MDMA was replaced with methylone and butylone, the animals toggled the bar about half as frequently, which Dr.

Halpern testified supported the conclusion that methylone and butylone (neither of which is listed in the Drug Equivalency Tables) are about half as potent as MDMA. This testimony is consistent with testimony that Dr. Prioleau gave in a case involving methylone. See United States v. Marte, 586 Fed. App'x 574, 575 (11th Cir. 2014)("Undisputed testimony from Dr. Cassandra Prioleau, a pharmacologist for the Drug Enforcement Agency, established that the Agency used a widely accepted methodology to determine that methylone is 'most related' to MDMA; methylone, like MDMA, acts as a stimulant on the central nervous system; and methylone is half as potent as MDMA."). See also United States v. Chong, 2014 WL 4773978 (E.D.N.Y. Sept. 22 2104)(applying 1:200 ratio in methylone case).

Calling ethylone "a weaker analog of methylone" and referring to research by Simmler published in the British Journal of Pharmacology, Dr. Halpern testified that ethylone was less potent than methylone. Asked to compare the potency of MDEA, methcathinone, and khat (all of which are listed in the Drug Equivalency Tables) with the potency of ethylone, Dr. Halpern selected methcathinone as satisfying the third factor in Application Note 6.

Notwithstanding Dr. Prioleau's hesitation in opining on the potency of ethylone, this court is persuaded by Dr. Halpern's testimony that MDMA and MDEA are both more potent than

methcathinone, and that methcathinone is more potent than ethylone. Dr. Prioleau might have been more comfortable if she had had at least as much research to rely on as she had when she opined on the potency of methylone. Unfortunately, ethylone appears to have been studied less. But Application Note 6 does not require perfection. It asks the court to consider matters "to the extent practicable." Dr. Halpern had credible data on which to base his opinion that it made more sense to equate ethylone's potency to methcathinone's potency than to MDEA's potency. Confining itself to listed substances (and therefore disregarding methylone at this point), this court concludes that the amount of ethylone and the amount of methcathinone needed to produce substantially similar effects diverge less than the amount of ethylone and the amount of MDEA needed to produce substantially similar effects.

III. CONCLUSION.

This court concludes that the listed substance most closely related to ethylone is methcathinone. The court rejects the Government's argument that MDEA is the listed substance most closely related to ethylone.

While ethylone has a chemical structure that is substantially similar not only to methcathinone but also to MDEA, and while ethylone, methcathinone, and MDEA have substantially similar effects on the central nervous system, it is potency, the

third factor listed in Application Note 6, that is determminative. Ethylone's potency is more similar to methcathinone's potency than to MDEA's. This court therefore accepts Holmes's argument that methcanone, with its 1:380 ratio, is the listed substance most closely related to ethylone, rather than MDEA, with its 1:500 ratio, as the Government submits.

Further sentencing proceedings, including Holmes's variance request, have already been scheduled.

APPROVED AND SO ORDERED.

DATED at Honolulu, Hawaii; April 22, 2016.

/s/ Susan Oki Mollway
Susan Oki Mollway
United States District Judge

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